mechanism is left loaded as a weld is completed, one opposite pair of welderhead quadrants released to provide clearance, and a separate shear die used to remove the weld collar from the weld.

(2) Amend the paragraph at page 3, lines 13 - 20 to read:

A2 The welderhead uses a lever actuated shear die placed proximate the firebox of the welderhead. The improved shear die mechanism enables the jaws to remain fully clamped while the shear operation is accomplished. Unlike prior shear die mechanism actuators, the instant actuator enables the use of extremely strong arms on the welderhead and related structure and hydraulics that will enable the pulling of the rails themselves as well as the forging or upsetting operation while maintaining the after-forged position. Improved clearance and strength enable the elimination of many of the separate steps necessary for the combination of rail pulling, forging and shearing thereby enabling the performance of these functions smoothly and continually.

(3) Amend the paragraph at page 4, line 19 to page 5, line 2 to read:

A3 A flash butt rail welding welderhead 10 uses paired quadrants 12, 14 to capture ends of rails 16. A shear die set 18 is formed to correspond to the section of the cold rail 16. The shear die set 18 is put in place and actuated through push rod and shaft assemblies 20, themselves coupled to levers 22 enabling clearance in a welderhead 10 using extremely structurally strong quadrants, 12, 14, that have large sections to enable high strength and much larger forces. In this manner a single welderhead 10 can be used for multiple purposes including pulling or stretching rail strings to flash butt forging while under tension and shear die operation without releasing rail tension and forging load. The

device adapted to provide these combined functions is sometimes referred to as a Puller/Welder Combo.

(4) Amend the paragraph at page 5, lines 2 - 10 to read:

A4 The welderhead 10 has four quadrants, as is known in the art. For clarity, only the right front quadrant 12 is shown in Fig. 1 and 3. Fig. 2 shows a pair of quadrants 12, 14. One of ordinary skill will understand the generally symmetric arrangement of the pivotally and slidably interconnected four quadrants. Quadrant 12 has trunnion 30 formed in boss 32 and arm 34 extending downward therefrom. Arm 34 holds clamping pad 36 and electrode 38 which engages rail 16 with corresponding pad 36 and electrode 38 clamp rail 16 therebetween. This welderhead arrangement enables a rail pulling and stretching capacity of 150 to about 200 tons. A capacity of 200 tons is preferred. The welderhead can also have a pushing or forging capacity.

(5) Amend the paragraph at Page 6, lines 5 - 8 to read:

SD Passing through apertures 56 in arm 34 cylinder 50 and pushrod assembly 58. This provides clearance so that cylinder 50 and pushrod assembly 58 can pivot slightly at mount 54 as the end of lever 22 circumscribes an arc as it moves. The shear die set 18 is pushed by plate assemblies 60, 62 on which lever 22 bears through fasteners 46, bearings or bushings 64 and pins 66.

(6) Amend the paragraph at page 6, lines 12 - 22 to read:

A1 The welderhead 10 will pull the rail, weld a rail, shear the welded rail, and hold the welded rail until the weld cools adequately. It may be contained as a single unit and

suspended either from a single point or multiple points. The welderhead 10 is formed and arranged so that no part of the welderhead 10 will extend below the bottom surface of the rail base, except for the shear tooling. The welderhead 10 will be shielded from damage which may be caused by the welding process from weld initiation through rail shearing. The design described herein may be expected, when optimized, to enable a Welder/Puller Combo that, despite its high capacity, the welderhead 10 will, when fully closed for storage, fit within an envelope of 7' long x 4' wide x 4' high. The weight of the welderhead 10 when fully operational may feasibly be such that it can be carried in an over-the-road truck or van (not shown) that, when fully fueled and operational will be road legal without permits in most of the 50 states. The optimized design consistent with the teachings herein may be expected to have the operational advantage that only one man will be necessary to operate the equipment. The welderhead 10 will be able to make welds in low, maintenance and high stress applications.

(7) Amend the paragraph at page 7, lines 1 - 3 to read:

In Fig. 5, the shear die set 18 has a pair of brackets, 70, 72 pivotally connected, at pivot 74 and a pair of replaceable die members 76, 78. These are fitted as described above and actuated with the mechanism also described.

(8) Amend the paragraph at page 7, lines 4 - 8 to read:

The welderhead 10 of the design and having the features taught herein is capable of producing 20 non-stressed or about 4 - 6 tension welds per hour in-track. This includes Positioning and Placement of the welderhead 10 , clamping to the rail, completing an

about 7" rail pull, aligning to specification, preheating, flashing, forging and shearing the weld-release of the rail and removal from the rail.

(9) Amend the paragraph at page 7, lines 9 - 11 as follows:

The welderhead 10 taught herein has a weld cycle time from weld initiation until completion of shearing for 136 lb. /yd. rail of about three (3) minutes. The welderhead may be expected to produce 15,000 welds between major overhauls.

(10) Amend the paragraph at page 7, lines 12 - 23 to read:

The general standards for rail welding, including rail sizes and sections, specifications for Steel Rails, Fabrication of Continuous Welded Rail and rail metallurgies are set forth in the 1996 issue of publications of A.R.E.A. (American Railway Engineering Association). This organization has since merged with other engineering support organizations to form AREMA; the American Railway Engineering and Maintenance-of-Way Association. Specifically, the publications 1996 A.R.E.A. design of Recommended Rail Sections; 1996 A.R.E.A. specifications for Steel Rails; 1983 A.R.E.A. specification for Fabrication of Continuous Welded Rail; 1996 A.R.E.A. Standard for Rail metallurgies to be welded; 1996 A.R.E.A. High-Strength Grade designations; and 1986 Grades 700, 900A, 900B and 1100 are incorporated by reference as if fully set forth herein. Rail welds produced by the welderhead 10 will comply with the latest issue of the A.R.E.A. specification for Fabrication of Continuous Welded Rail except for section 2.2.2.b.(2); the first two sentences, 'Horizontal alignment ... Field side.' While the welder/puller combo can meet the above described standards, the invention is not intended to be limited to any particular set of regulatory standards.

(11) Amend the paragraph at page 8, lines 13 - 19 to read:

The material, size, surface and clamping force applied through electrode are formed and arranged such that contact with the rail does not produce any vertical surface deformations deeper than about 0.040 inch and with a root radius less than about 0.062 inch and does not form any horizontal deformations. Any surface deformations that do form will, in any event, not be within the Heat Affected Zone (HAZ) produced during welding. The precise level of control of clamping, utilizing controls, valves and hydraulic hoses and fitting is also such that "soft clamping" of the rails can be accomplished to facilitate alignment.

(12) Amend the paragraph at page 8, line 20 to page 9, line 4 to read:

A major advantage of the welderhead 10 of the invention is the ability to combine in a single unit, the ability for the three functions of rail pulling, flash butt welding [forging] , shearing and maintaining the "after forged" [displacement without any change in platen] position. The horizontal plane of force of the rail pull will have a [mechanized] mechanical adjustment to approximately match the neutral axis of all rail sizes specified. The welderhead 10 has a rail pulling (together) ability of about 200 tons. The pulling ability will be sufficient for moving and stretching substantially all [lengths of] rail sections currently used in the field. It will be typically able to overcome tensile and frictional resistance of steel rail lengths of up to about one quarter to one third of a statute mile in length, as well as forging the rail ends together and maintaining that position after forging.

(13) Amend the paragraph at page 9, lines 5 - 9 to read:

The welderhead 10 will have a rail pushing (apart) ability to the limit of the rails, before rail buckling occurs, typically 40 tons. The push-ability will be used for resisting longitudinal rail compressive forces and reversing the inward movement of the rail to maintain stable flashing and reverse out of a butt-up (short) situation. The proper forging force will be achievable and constant regardless of the rail pulling load previous to forging.

(14) Amend the paragraph at page 9, lines 10 - 13 to read:

In addition to the force able to be applied, the distance or stroke of the welderhead is advantageously configured. The total usable stroke for longitudinal rail movement is about 7 inches. The stroke of the welding electrode assemblies will allow for a total rail consumption during welding of two (2) inches. The stroke may be divided approximately as follows:

(15) Amend the paragraph at page 10, lines 17 - 21 to read:

The welding of rails which have been previously drilled for installation of rail joints or to facilitate handling must be considered with respect to welding current transfer. Rail drilling-patterns to be accommodated are as shown in the latest issue (1995) of the A. R. E. A. design of Recommended Rail Sections. Six hole bars with the four outside holes drilled will have required current transfer parameters calculated by the control system. As described previously, while the welder/puller combo can meet the above described standards, the invention is not intended to be limited to any particular set of regulatory standards.

(16) Amend the paragraph at page 10, line 22 to page 11, line 2, to read:

As described above, weld shearing is an essential step in the production of a suitable, finished welded rail. On new rail, forged material needs to be sheared to within .068 of the parent rail contour. In this invention, the shearing process will be accomplished without relaxation of the clamp cylinders. The shearing function will be a fully automatic function programmed as part of the weld cycle.

(17) Amend the paragraph at page 11, lines 3 - 6 to read:

Shearing may be accomplished in three stages, a single stage, multiple stages or a progressive stage. The shearing arrangement will not produce any shear drag, stress risers or cut into the parent rail section. In locating the weld and welderhead, it will be important to locate the weld so that shearing will take place in the crib area and not over a tie.

(18) Amend the paragraph at page 11, lines 7 - 11 to read:

The welderhead is designed so that an area between the quadrants is defined. This area is known as the firebox. The firebox will be large enough that, when the welderhead 10 is in the fully closed position, the firebox will be able to contain the fully sheared weld, the shear die and the sheared weld collar. Also, the sheared weld collar shall at no time come under compression.

(19) Amend the paragraph at page 11, lines 12 - 19

A typical control system will control the following functions from the operator control station. Many of these functions are known to one of ordinary skill in the art. The manually controlled functions are: Rail pulling / pushing / welding, Rail end squaring (to achieve full face flashing), Program by-pass, Re-shearing, Weld program stop, Emergency stop, Program extend, Program select A or B (in truck, not on operator control) Post-heat initiation, Electrode clamp / release, Alignment, Dry cycle / auto burn off, Welder up / down, Boom in / out, Boom left / right, Weld program start, Puller clamp / release and Free / Closure - Opens to full stroke or 85mm.

(20) Amend the paragraph at page 11, line 23 to page 12, line 3 to read:

The mode of upsetting to a fixed distance or refusal and the mode of preheating (flashing, pulsation or shorting) will be selectable by the operator at the program control station. The upsetting force for refusal will be optimally selectable from about 36 to 72 tons in increments of about one ton regardless of any rail drag or tension. Upsetting force, when welding to refusal, will not vary by more than one ton.

(21) Amend the paragraph at page 12, lines 6 - 11 to read:

The control system will control rail ends to prevent interruptions in flow of current and shorting (extinguishing of the arc) for 3 cycles or greater during flashing or accelerated flashing. The variables in the above functions will be manually controllable from the programming control station. The control may be adapted to limit the ability of the welderhead 10 to reverse beyond the point of the original set up position, minimize total rail consumption and minimize machine over capacity.

(22) Amend the paragraph at page 12, lines 12 - 17 to read:

Transducers will measure Welding current, Welding platen position and Pulling/Upsetting force. Reporting progress and performance can be preferably included on performance factors such as slippage detection during forging between the rail pulling clamps and the rail, track spring rate and total rail consumption. Monitoring these can signal a go/no go decision. Upon completion each weld can have reported secondary current interruptions, upsetting (forging) distance, force and cooling hold time and then compared to standards.

(23) Amend the paragraph at page 12, lines 20 - 23 to read:

A typical operation may be performed with the following steps. First, the operator measures the rail gap and compares it to the acceptable range. Second, the operator lowers welderhead 10 to rail 16 using boom controls. Third, the operator places right hand side of welderhead 10 in welding position and clamps the welding machine a specific distance from the rail end. The shear die may be integral or then be manually put in place.

(24) Amend the paragraph at page 13, line 23 to page 14, line 3 to read:

While the present invention has been disclosed and described with reference to a single embodiment thereof, it will be apparent that variations and modifications may be made therein. It is also noted that the present invention is independent of the machine being controlled, and is not limited to the control of flash butt rail welding machines. It is, thus, intended in the following claims to cover each variation and modification that falls within the true spirit and scope of the present invention.

(25) In the Brief Description of the Drawings at page 4, after line 16 add the following new line:

Figure 5A is a front elevational view of the shear die of Fig. 5 in an open position.